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Findings and Recommended Actions

Findings

Setting

1. **California water planning and management requires full and balanced consideration of the State's richly diverse people, environments, businesses, land uses, climates, geology, and variable hydrology.**

   Diverse and variable water uses are distributed throughout the State and over time, which do not coincide with natural water supplies. As a result of increased competition among water uses, management of California's water system has become increasingly challenging, complex, and at times contentious. However, water issues are being resolved with leadership from the State and federal governments and partnerships with local and regional stakeholders. Local, regional, and State governments and water suppliers each have a role in improving water supply reliability for the existing and future population and the environment.

2. **Providing food and fiber crop products to Californians, as well as to other states and countries, consumes, and will continue to consume, more water than is consumed by all other household needs.**

   California is the top agricultural producer in the nation contributing over half of the nation's fruit, nut, and vegetable production. Many counties rely on agriculture as a primary economic contributor.

3. **Since the 1800's, California has experienced aquatic and riparian habitat degradation and declines in freshwater biodiversity throughout the State.**

   Hydraulic mining and gold extraction in the 1800s, dam construction and operation, pollution, flood control, urbanization, increases in Delta exports and upstream diversions, and introduction of exotic species have all contributed to the decline in ecosystem health. Flows on many rivers and streams currently do not resemble natural hydrographs, which is a contributing factor to impaired ecosystem functions, reduction and loss of native species and habitats, impacts on commercial fisheries, and degraded water quality.

4. **Transporting water is the largest user of electrical energy in California, which has both economic and environmental implications and impacts. At the same time, hydroelectric power produces a significant percentage of the State's total energy.**

   Water management activities that consume energy comprise a large percentage of the State's total energy consumption. Hydroelectric-producing reservoirs and forebays provide flexibility that allows consumption during off-peak demand periods and production during peak demand.

Current Conditions

5. **During the past decade, California's population has increased by about 600,000 people per year. The current population of over 36 million is projected to increase by another 17 million people to 53 million by year 2030.**

6. **From a statewide perspective, California currently meets most of its water management objectives in most years. However, even today, water supply and quality challenges persist on local and regional scales.**
   a. Despite the increase in population, advances in water conservation and recycling, combined with infrastructure improvements including new storage facilities, have reduced and met most additional demands. Cities use about the same amount of applied water today as they did in the mid-1990s, but accommodate 3.5 million more people. Water conservation and demand reduction strategies are expected to continue playing a prominent role in achieving future goals.
   b. Most agricultural water demands are met in average water years, but in some areas, water used for agriculture has been transferred to urban areas, environmental restoration, and groundwater replenishment. Even in average water years, some growers forego planting and other agricultural operations because they lack a firm water supply. Farmers over the past 25 years have learned to grow 50 percent more crops per acre-foot of applied water by improving productivity and efficiency.
   c. More water is dedicated today to restore ecosystems; however, some environmental requirements are not always met, and we do not fully understand ecosystem needs and their response to flows.
   d. California relies on over-pumping its groundwater basins, which reduces available water supply, increases pumping costs, and in some areas degrades groundwater quality.
   e. In many areas surface water and groundwater are impaired by natural and human-made contaminants that have effectively reduced the water supply that can be used. These contaminants degrade environmental resources, threaten human health, and increase water treatment costs.

7. **California has not experienced the hardships and environmental pressures of a prolonged drought since the early 1990s, but we know that similar or worse conditions of unreliable water supplies can and will reoccur.**

   During long or extreme droughts, water supplies are unreliable, increasing conflicts among water users. Water quality is degraded, making it difficult and costly to make it drinkable. Groundwater levels decline and many rural residents dependent on small water systems or wells run short of water. Business is adversely impacted, jeopardizing the economy and irrigated agriculture. Ecosystems are strained, risking sensitive and endangered plants, animals, and habitats.

8. **California has a very large and complex water system with a highly decentralized system of governance involving State and federal agencies, thousands of local agencies, governments and private firms, and millions of households and farms.**

   This decentralization has a major influence on daily management, planning, and policy making. Competing and conflicting roles and responsibilities make it difficult to integrate regional water management. Differing roles of the various State, federal, and local governments during planning can also create coordination difficulties. The organizational structure of State government and past practices has also led to insufficient communication, coordination, and cooperation among numerous State agencies and departments dealing with water.

9. **Tribal water rights for water to meet tribal economic and cultural needs are often encroached upon or unmet.**

   California's water rights framework and federal Reclamation Act policies have evolved over the past 100 years, largely without regard to the water resources reserved for tribal lands. Previous Water Plan updates did not consider tribal interests or water demands.

10. **Water rights in California are subject to State constitutional prohibition of wasteful or unreasonable use. Rights to use water are also subject to the State's obligation under the Public Trust Doctrine as trustee of certain resources for Californians.**

    California's water law and policy (Article X, Section 2 of the California Constitution) "requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable." It places a significant limitation on water rights by prohibiting the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water. The Public Trust Doctrine is a legal doctrine that imposes responsibilities on State agencies to protect trust resources associated with California's waterways, such as navigation, fisheries, recreation, ecological preservation and related beneficial uses.

11. **Recent State policy establishes social equity as a State planning priority to ensure the fair treatment of people of all races, cultures, and income.**

    California continues to face issues of equitable distribution of clean water and providing equal opportunities for Californians, particularly those from disadvantaged and under-represented communities, to participate in decisions on water policy, allocation, quality, and how to deal with potential adverse impacts to communities associated with water programs and projects.

Future Uncertainties and Scenarios

12. California's growing and changing water demands require more accurate information to reduce uncertainty in water planning.

Existing data and analytical tools are not capable of providing complete answers to all relevant questions about current and future water supplies, demands, quality, and management strategies. Better data and tools are needed to enable us to gain greater efficiencies from limited resources and reduce controversy and conflicts in adapting our water system to new demands.

13. As a result of global climate change and other factors, California hydrology will likely not be the same as in the past century.

While many uncertainties remain, primarily on the degree and timing of change to be expected, it is likely there will be reductions to the Sierra snowpack, a rise in sea level, and earlier storm runoff. These changes have major implications for water supply, flood management, and ecosystem health.

14. Based on current trends, California's average-year water demand could increase between 3.5 million and 6 million acre-feet by 2030. This additional water would serve 17 million more Californians, sustain California's economy and agricultural industry, meet environmental restoration and water quality objectives, and eliminate groundwater overdraft.

a. To acknowledge future uncertainty, this Water Plan update considered three plausible scenarios for 2030, rather than a single "likely future." One 2030 scenario is based on existing trends continuing into the future. Another scenario assumes California is more efficient in using water while growing its economy and restoring the environment. The third scenario is based on a highly productive California, respectful of the environment, but with more people and lower water use efficiency than the other scenarios.

b. The water demands and supplies for these scenarios will be quantified by the next five-year California Water Plan update in 2008. For consideration now, the Department of Water Resources estimated the additional average-year water demands by 2030 based on continuation of current trends. Water resources would be further stretched during long or severe droughts. One would expect the estimate for 2030 water demands to be lower for the "higher use efficiency" scenario and higher for the "resource intensive" scenario.

Regional Planning and Diversified Strategies Improving Water Management

15. Regional planning efforts are now integrating a broader range of water management activities and addressing a wider range of interests.

Throughout California, stakeholders are beginning to work together in their regions and watersheds to develop programs that include multiple jurisdictions and provide multiple resource benefits. Water agencies in many regions are successfully employing a diverse mix of management strategies. Experience is showing that these regional efforts can result in solutions that are more closely tailored to meeting regional needs than additional, large-scale State or federal efforts. Overall, this increased focus on regional planning should result in solutions that solve water management problems more efficiently, consider other resource issues, and enjoy broader public support.

16. Local, regional, tribal, and statewide planners now have a diverse set of investment choices in the form of resource management strategies and essential support activities.[1]

a. The California Water Plan features, but does not prescribe two dozen resource management strategies and several support activities from which regional, local, and State planners are and can select according to regional needs and goals. Thoughtful implementation of these strategies and activities helps reduce conflicts among water users during multiyear droughts, protect water quality, meet the needs of the environment, and provide for many other regional water management objectives.

b. While not additive, the water supply benefits of these strategies could meet or exceed the additional water demand estimate for 2030 average year conditions assuming the continuation of current trends. These supply benefits will be better quantified in subsequent phases of this update.

c. The plan includes actions in the Bay-Delta Program Record of Decision and is consistent with recommendations from recent State-sponsored water initiatives.[2]

[1] These resource management strategies and essential support activities are listed in the Strategy Investment Options table that follows and described in Chapters 1, 4 and 5. Detailed narratives on each resource management strategy are also presented in Volume 2.

[2] The Water Desalination Task Force, the State Recycling Task Force, the Stormwater Quality Task Force, the Floodplain Management Task Force, the Governor's Advisory Drought Planning Panel, and California's Groundwater (DWR Bulletin 118-03).

Recommended Actions

1. **California needs to invest in water conservation, efficient water management, and development of reliable, high quality, sustainable, and affordable water supplies to maintain and improve California's economy, environment, and standard of living.**

   To provide for the future, California must rely on a diverse set of water management strategies to (1) use and manage its existing water supplies efficiently; (2) implement new technologies to further water conservation, augment supplies, and improve water quality; and (3) increase water storage to improve flexibility and complement the benefits of other water management tools. To realize the full potential outlined in this Water Plan update, California needs significant and continuous investments for regional integrated planning, more public and private partnerships, project implementation, and better data and analytical tools.

2. **The State recognizes the critical role regions must play in California water planning and management and the need to better coordinate water planning with land use planning and urban development.**

   The State must provide incentives and assist regional agencies and governments to prepare their integrated resource and drought contingency plans on a watershed basis, to diversify regional resource management strategies, and empower regions to implement their plans. The State should assist cities, counties, and Local Agency Formation Commissions to prepare a Water Element for their general plans and help them implement existing legislation and State policies to improve coordination between water and land use planning.

3. **The State needs to lead water planning and management activities that regions cannot accomplish on their own, the State can do more efficiently, involve inter-regional or inter-state issues, or have broad public benefits.**

   These activities include, but are not limited to: (1) preparing California Water Plan updates as a public forum to integrate State, federal, regional, and local plans; (2) operating and maintaining the State Water Project; (3) providing regulatory oversight to protect public health and safety, including water quality, flood management, and dam safety; (4) participating in major regional initiatives, such as the CALFED Bay-Delta Program, and (5) forming public-private partnerships to implement regional programs like the Colorado River Quantification Settlement Agreement. Other State activities are included in recommendations that follow.

4. **California needs to develop broad and realistic funding strategies that define the role of public investments for water and other water-related resource needs over the next quarter century.**

   The State needs to lead an effort to identify and prioritize funding strategies to finance regional and statewide water planning, programs, and infrastructure. The State needs to clearly articulate when, and for what actions, to use public investments from State and federal sources. California's water finance plan must also recognize the critical role of local public and private funding based on the principle of beneficiary pays and user fees.

5. **California needs to rehabilitate and maintain its aging water infrastructure, especially drinking water and sewage treatment systems, operated by State, federal, and local entities.**

   The State should lead an effort, with input from public and private owners of water infrastructure, to identify and prioritize water infrastructure maintenance of key components with regional or statewide significance. This effort should also identify and implement financing strategies for continued public investments in the resulting infrastructure maintenance plan.

6. **California needs to define and articulate the respective roles, authorities, and responsibilities of State agencies and local agencies and governments dealing with water.**

   The State needs an internal review of how State resource agencies do business to identify ways to make these agencies more efficient, effective, and responsive to Californians. In light of the growing regional role in water planning and management, the State needs to redefine how to empower and assist regional water plans and programs. Establishing a cabinet-level strategic water team would strengthen coordination among State agencies dealing with water and ensure their strategic plans and activities are consistent with the Governor's water initiatives and State policy.

7. **The State needs to inventory, evaluate, and deal with the effects of contaminants on surface water and groundwater quality.**

   The evaluation should include the effect of contaminants on long-term sustainable water resources in California, as well as cost-effective ways to improve water quality. To safeguard water quality for all beneficial uses, the State should also adopt a preventive strategy that promotes integration of pollution prevention, water quality matching, and, for drinking water, treatment and distribution.

8. **The Department of Water Resources, in cooperation with other State, federal, tribal, local, and research entities, should improve data and analytical tools needed to prepare, evaluate, and implement regional integrated resource plans and programs.**

   California needs better data and analytical tools to produce useful and more integrated information on water quality, environmental objectives, economic and equity issues, and surface and groundwater interaction. A consortium of public and private entities, with State leadership and stakeholder input, should prepare a long-term plan to peer-review and improve data and analytical tools, as well as develop presentation and decision-support tools to make complex technical information more accessible to decision-makers and resource managers. DWR should build and maintain the Water Plan Information Exchange (Water PIE), an online information management system, to assist regional and local agencies and governments.

9. The State should invest in research and development to commercialize promising water technologies and to help predict the effects of global climate change.

The State should work with California research and academic institutions, like the California Academy of Science, California Council on Science and Technology, the University of California, and other universities and colleges, to identify and prioritize applied research projects leading to the commercialization of new water technologies and better scientific understanding of California's water-related systems. The State should also work with and assist researchers to monitor and predict the effects of global climate change on California's water systems and the environment. DWR should develop alternative flow data to help State and regional planners test potential effects of global climate change on different management strategies.

10. DWR should encourage and assist tribal government representatives to participate in statewide, regional, and local water planning processes.

DWR should include tribal water demands in future Water Plan updates and advise federal agencies of tribal water issues that are discovered.

11. DWR and other State agencies should explicitly consider public trust values in the planning and allocation of water resources to protect public trust uses whenever feasible.

The State should exercise continuous supervision over its navigable waters, the lands beneath them, and the flows of their tributary streams to protect the public's rights to commerce, navigation, fisheries, recreation, ecological preservation, and related beneficial uses.

12. DWR should encourage and assist representatives from disadvantaged communities and vulnerable populations, which have experienced disproportionate health and environmental impacts, to engage in statewide, regional, and local water planning processes.

13. The CALFED Bay-Delta Program needs greater federal commitment, agency involvement, spending authorization, and funding to ensure continued and balanced implementation.

The State should continue to provide leadership for the CALFED Bay-Delta Program to ensure continued and balanced progress on greater water supply reliability, water quality, ecosystem restoration, and levee system integrity. The State should cooperate with the federal government to review and revise the implementation plan for the CALFED Bay-Delta Program to reflect the current fiscal climate, and accordingly adjust progress and expectations in all elements of the Bay-Delta Program to achieve balanced implementation.

Strategy Investment Options

	Water Management Objectives												
	Potential Demand Reduction, Reallocation & Supply Augmentation by 2030 **MAF per year**	**Improve Drought Preparedness**	**Improve Water Quality**	**Operational Flex & Efficient**	**Reduce Flood Impacts**	**Environmental Benefits**	**Energy Benefits**	**Recreational Opportunities**	**Reduce GW Overdraft**	**Reduce Pollution**	**Reduce Ag Drainage Impact**	**Estimated Investment by 2030** **Billion $**	
Resource Management Strategies													
Demand Reduction													
Agricultural Use Efficiency	**0.3 – 0.6** (a)	●	●	●		●			●	●		**0.13 – 2.5**	(b)
Urban Use Efficiency	**1.5 – 2.5** (c)	●	●	●		●	●		●	●		**staff**	(d)
Operational Efficiency & Reallocation of Water													
Conveyance		●	●	●	●	●	●	●	●		●	**1.13**	(e)
System Reoperation	**0.15** (f)	●		●	●	●							(g)
Water Transfers	(h)	●	●	●		●			●			**staff**	(i)
Supply Augmentation													
Conjunctive Mgmt & Groundwater Storage	**0.5 – 1.5** (j)	●	●	●	●	●			●			**1.5 – 4.5**	(k)
Desalination – Brackish	**0.1 – 0.3** (l)	●	●	●					●			**0.2 – 1.6**	(m)
Ocean	**0.2** (n)	●	●	●					●			**0.7 – 1.3**	(o)
Precip. Enhancement	**0.3 – 0.4** (p)	●					●		●			**0.2**	(q)
Recycled Muni. Water	**0.9 – 1.4** (r)	●	●	●		●	●	●	●	●		**6.0 – 9.0**	(s)
Surface Storage – CALFED	**0.7 – 1.0** (t)	●	●	●	●	●	●	●	●	●		**3.3 – 5.6**	(u)
Surface Storage – Regional/Local	●	●	●	●	●	●	●	●	●	●			(v)
Water Quality													
Drinking Water Treatment & Distribution		●	●	●						●		**19.0 – 21.0**	(w)
GW/Aquifer Remediation	**1.0** (x)	●	●	●					●	●		**20.0**	(y)
Matching Quality to Use			●			●					●	**0.08**	(z)
Pollution Prevention			●	●		●		●		●	●	**15.0**	(aa)
Urban Runoff Mgmt	●	●	●	●	●	●		●	●	●			(bb)
Resource Management													
Ag. Lands Stewardship	**0.3** (cc)	●	●	●	●	●	●	●	●	●	●	**5.3**	(dd)
Ecosystem Restoration						●		●		●		**7.5 – 11.25**	(ee)
Floodplain Mgmt				●	●	●		●				**0.48**	(ff)
Recharge Area Protection	**5.0** (gg)	●	●	●		●			●	●		**5.0**	(hh)
Urban Land Use Mgmt	●		●			●			●	●			(ii)
Water-Dependent Rec.								●				**0.02**	(jj)
Watershed Mgmt		●	●		●	●		●	●			**staff**	(kk)
Other Strategies	Objectives Vary by Strategy (See Narrative)												
Essential Support Activities to Integrate Strategies and Reduce Uncertainty													
Economic Incentives & Water Pricing	**Support all objectives and strategies**												(ll)
Regional Integrated Resource Planning & Mgmt												**0.3**	(mm)
Statewide Water Planning												**0.12**	
Data & Tool Improvement												**0.25**	
Research & Development												**0.4**	(nn)
Science												**3 – 5% of total**	(oo)

Note: Shaded boxes to be filled.

Notes for Strategy Investment Options Table
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This table summarizes the Water Plan's Strategy Investment Options for State, federal, regional, and local entities to improve water management in California through the year 2030. Details on implementation and financing are presented in Chapter 5. The resource management strategy narratives are presented in Volume 2.

Table Layout

The actions are grouped by **resource management strategies (top section)** and **essential support activities (bottom section)**, like planning, research & development and economic incentives.

Table Columns

Column 1 shows the ***Resource Management Strategies (top section)*** and ***Essential Support Activities (bottom section)*** that are available to regions to achieve various water management objectives.

Column 2 shows the estimated ***Potential Demand Reduction, Reallocation of Supply, and Supply Augmentation by 2030****,* with a footnote describing which benefit would be achieved and data sources. A dot (●) is shown for strategies that would have a supply benefit that could not be quantified at this time.

Columns 3-12 show other ***Water Management Objectives*** that could be achieved by implementing a strategy. A dot (●) is shown if a strategy could have direct and significant benefits for various water management objectives.

Column 13 shows a range of ***Estimated Investment by 2030*** of implementing a strategy or performing a support activity to achieve the indicated annual benefits by 2030 (not including ongoing operation and maintenance costs).

Table Footnotes

General and specific notes are listed below.

Notes for Strategy Investment Options Table
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General Notes for Potential Demand Reduction, Reallocation of Supply, and Supply Augmentation by 2030 (shown in Column 2)

The ranges shown in Column 2 are estimates for potential demand reduction, reallocation of supply, and supply augmentation based on a review and aggregation of available information from existing studies.

Supply estimates may not be additive because various strategies can compete for the same water. For example, new surface storage may compete for the same water that could be used by conjunctive management strategies. The estimates may not be comparative because the estimates were derived from numerous studies based on different assumptions and data sources, as described below in Specific Notes (a) – (kk). In some cases, the values represent a local or regional benefit and may not provide statewide benefits. For example, water transfers that derive supply from land fallowing can reallocate water (i.e., change of use of existing supplies) that may serve as additional supply from a local or regional perspective, but would not augment supplies from a statewide perspective. In addition, implementing some strategies, like water dependent recreation or ecosystem restoration may increase total water demands.

Specific Notes (a) – (pp):

(a), (b) Agricultural Water Use Efficiency – Reduce demand. Bay-Delta Program estimates for 2020 level of demand and Bay-Delta Program Solution Area only. This does not include Imperial Irrigation District water transfer. Subject mater experts are developing statewide estimates. Water savings estimates are from CALFED Ag WU Efficiency Technical Appendix and Colorado River Quantification Settlement Agreement.
The cost estimates are derived from potential on-farm and district wide efficiency improvements associated with "real water savings". Details of estimates and assumptions are in the CALFED WUE Program Plan (Final Programmatic EIS/EIR Technical Appendix- July 2000). Water savings and associated costs for All American Canal and Coachella Branch Canal lining are not included in the cost analysis.

(c), (d) Urban Water Use Efficiency – Reduce demand. 1) Bay Delta Program (2000) *Net Water Estimates;* and 2) Pacific Institute end use study (2003). Cost estimate in progress by staff.

(e) Conveyance – Cost estimated = $1.125 billion, as follows:
($1 billion for CALFED Delta conveyance improvements) + ($125 million for Lining of the All American and Coachella canals) = $1.125 billion total cost.

(f), (g) System Reoperation – Augment supply and reallocate water. Supply benefit is based on future implementation of the Bay Delta Program's Environmental Water Account from willing sellers reoperating local and regional surface water projects. Implementation of other resource management strategies will often result in system reoperation.

(h), (i) Water Transfers – Supply benefits associated with water transfers come from implementing other resource management strategies, in particular, agricultural water use efficiency, system reoperation, conjunctive management, and temporary land fallowing (included in agricultural lands stewardship). Cost estimate in progress by staff.

(j), (k) Conjunctive Management & Groundwater Storage - Augment supply. Conjunctive Management – The supply benefits were derived from: 1) Proposition 13 Groundwater Storage Applications to DWR for fiscal year 2001-2002; 2) Association of Groundwater Agencies report entitled, "Groundwater and Surface Water in Southern California" (2000); 3) Natural Heritage Institute report entitled, "Feasibility Study of a Maximal Program of Groundwater Banking" (1998); 4) U.S. Army Corps of Engineers report entitled, "Conjunctive Use for Flood Protection" (2002); 5) Natural Heritage Institute report entitled, "Estimating the Potential for In-Lieu Conjunctive Management in the Central Valley" (2002). Cost estimates are extrapolated from Proposition 13 Groundwater Storage Applications to DWR for fiscal year 2001-2002. Cost estimates assume that the supply benefit is not restricted by Delta export constraints or conveyance capacity.

(l), (m), (n), (o) Desalination – Augment supply. Information and data are from "DWR October 2003 report "Water Desalination - Findings and Recommendations", California Coastal Commission's 2003 draft report "Seawater

Desalination and the California Coastal Act" and a DWR Desalination Database based on reports and articles in newspapers, newsletters, technical journals and trade journals." Primary information sources for the database are "Water Desalination Report" (weekly newsletter), International Desalination Association's Worldwide Desalting Plants Inventory series (issued biennially since 1970), "International Desalination & Water Reuse Quarterly" and California Water News, DWR's daily compilation of water news in California.

(p), (q) Precipitation Enhancement – Augment supply. DWR staff analysis (2004).
Cost estimated = $.2 billion, as follows: ($7 million/year for cloud seeding activities) x (25 years until 2030) + ($2 million for initial environmental studies) = $.2 billion.

(r), (s) Recycled Municipal Water – Augment supply. *Water Recycling 2030*; Recycled Water Task Force (2003).

(t), (u) Surface Storage - CALFED – Augment supply. Bay-Delta Program Storage Investigations staff (2003). Cost estimate based on DWR and U.S. Bureau of Reclamation report entitled, "California Bay-Delta Surface Storage Program Progress Report," April, 2004.

(v) Surface Storage – Regional/Local – No statewide cost estimates available.

(w) Drinking Water Treatment & Distribution – Cost estimate based on a formal needs survey by the U.S. Environmental Protection Agency.

(x), (y) Groundwater/Aquifer Remediation – Supply augmentation by 2030 could be as high as 1 MAF per year if aquifers not presently being used are tapped. [1] Estimated investment by 2030 would be 20 billion dollars.

[1] Groundwater that is presently being treated may continue to require treatment before use in 2030, and other current sources of groundwater may require treatment in the future. These sources are already a part of the supply, so there may be no net "supply augmentation." Nevertheless, remediation is required to maintain existing supplies.

(z) Matching Water Quality to Use – Cost estimate based on CALFED estimates.

(aa) Pollution Prevention – Cost estimate based on a formal needs survey by the U.S. Environmental Protection Agency.

(bb) Urban Runoff Management – Cost estimates are included under Pollution Prevention. See note (o) above.

(cc), (dd) Agricultural Lands Stewardship – Reallocate water. Supply benefit is based on future implementation of the Bay Delta Program's Environmental Water Account from willing sellers through temporary land fallowing.
Cost estimate = $5.3 billion, determined as follows:
Total cost is the sum of three components: (A) financial assistance, (B) technical assistance and (C) land acquisition.
A: USDA estimate of unmet need for its conservation cost-share programs = ($80 million/yr) X (25 yr till 2030) = $2 billion;
B: USDA estimate of unmet need for field staff = (800 persons) X ($90,000/yr/person) X (25 yr till 2030) = $1.8 billion
C: conservation easements on about 9% of 11.4 million total acres of farmland = (1 million acres) X $1500/acre = $1.5 billion
A + B + C = $2 billion + $1.8 billion + $1.5 billion = $5.3 billion.

(ee) Ecosystem Restoration – Cost estimate = $7.5 –11.25 billion, as follows:
($150 million/year for CALFED activities) X (25 years until 2030) = $3.75 billion for CALFED area.
($3.75 billion) X (an expansion factor of 2 or 3 to cover areas outside CALFED) = $7.5 –11.25 billion

(ff) Floodplain Management – Cost estimate = $475 million, as follows:
($57 million for Flood Protection Corridor Program, disbursed over 3 years) = ($19 million/yr) X (25 years until 2030) = $475 million

(gg), (hh) Recharge Area Protection – Supply augmentation by 2030 could be upwards of 5 MAF if a surface water supply is available and facilities are in place. Estimated investment by 2030 could be $5 billion or more if more agencies initiate active recharge programs.[2]

[2] Recharge program costs include:

1. land acquisition for facilities and habitat offset (in one area, land prices are increasing 20% per year)
2. water supply
3. facilities to convey, recharge, extract, and pump
4. energy to pump water in and out
5. standby charge
6. operating and maintenance of facilities and land
7. treatment for water quality
8. replacement
9. administration
10. monitoring water quality and water levels
11. impact mitigation

(ii) Urban Land Use Management – No statewide cost estimates available.

(jj) Water-Dependent Recreation – Cost estimate considers construction of 4, 100-site campgrounds, at $3.5 million each.

(kk) Watershed Management – Cost estimate in progress by staff.

(ll) Economic Incentives and Water Pricing – Supply benefits obtained indirectly by providing incentives for changes to water management behavior by agencies and individuals. Program administration cost is the only direct cost.

(mm) Regional Integrated Planning & Management – Assumes $1 million per hydrologic region per year.

(nn) Research & Development – Assumes $10 million per year.

(oo) Science -- Costs for supporting science programs are assumed to be 3 to 5 percent of total implementation costs.